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THE CONVERSATION

'Godzilla' El Niño: time to prepare for mega-droughts

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Coming to a forest near you? Alpha/Flickr, CC BY-SA

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Walking on cornflakes. That's what it sounds like to hike through a rainforest in the grip of a strong drought. Each step crackles with dry snapping twigs and leaves. It's frustrating for field biologists like us – we can forget about glimpsing anything but the most oblivious of wildlife.

Rainforests aren't supposed to be bone-dry like this, and normally they're not. But at our Daintree Drought Experiment in far north Queensland, we and our colleagues have suspended more than 3,000 plastic panels above the forest floor to create an artificial mega-drought. The experiment began only three months ago but already the rainforest beneath is wilted and hurting.



Tinder-dry understorey at the Daintree Drought Experiment.

Yoav Daniel Bar-Ness

The Daintree drought is just a taste of what could be coming soon – not just to our experimental study site but to large swathes of Australia and beyond. Climatologists are telling us to buckle our seatbelts because the ride could get scary. Get ready, they're saying, for an event some are calling "Godzilla".

Not your average drought

Naming a drought after a giant fire-breathing reptile may not be very scientific, but it does grab one's attention. The most powerful driver of annual rainfall variation globally is the El Niño-Southern Oscillation, in which warm surface waters slosh back and forth across the Pacific Ocean, creating flooding rains in certain places and times and droughts in others. This isn't the only cause of rainfall variability around the world, but it's one of the biggest in terms

of its sheer scale and impact.

Climate researchers say this year's El Niño could be stronger than anything in living memory — stronger even than the event that pummelled large expanses of the New World and Western Pacific region in 1997-98. In that year, a single massive fire consumed over three million hectares of drought-choked rainforest, farmlands and indigenous territories in Brazilian Amazonia. Dense smoke caused more people to go to hospital for respiratory distress, and airports had to be closed repeatedly.



Aftermath of the devastating 1998 mega-fire in Amazonia.

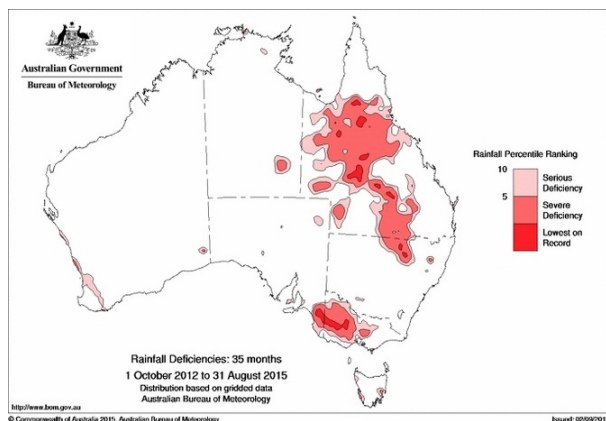
William Laurance

Soon afterwards, fires spurred by the same mega-drought rampaged across Indonesia and New Guinea. Huge expanses of Borneo burned.

In Australia, the El Niño led to widespread coral bleaching and increased stresses for forests, farms and cities already struggling with years of below-average rainfall. This El Niño interacted with other sources of weather variation, such as sea-surface temperatures in the Southern and Indian Oceans, to create the so-called Millennium Drought.

Be afraid

At the risk of sounding like a doomsayer, it's impossible to ignore the possibility that we could be facing even worse conditions in the near future. Over 80% of Queensland has already experienced a severe rainfall deficit over the last three years. And leading climatic models suggest the severity of extreme El Niño events and heatwaves will rise with global warming. Worldwide, seven of the ten hottest years on record occurred during or immediately after an El Niño year.



Large expanses of eastern Australia are already beset by strong rainfall deficits. Australian Bureau of Meteorology

In addition, rapidly expanding land-use changes are making ecosystems far more vulnerable to droughts and fire. For instance, forests that have been logged or fragmented are drier and have much heavier loads of flammable slash than do pristine forests.

Finally, as new roads proliferate almost everywhere, so do the number of human-caused ignition sources. Ecosystems where fire was once foreign — such as the world's deep rainforests — now burn with increasing regularity. For such environments and their wildlife and carbon stores, the effects can be devastating.



A logging operation in Indonesian Borneo. William Laurance

Time to start planning

If we don't want to risk such catastrophes, we need to get smarter. Be they natural or human-caused, droughts are going to keep happening. We can't stop them but we can at least get ready.

A big priority is to invest in fire control and prevention. Recent efforts in Brazil show that wildfires can be substantially reduced by proactive fire bans and improving rural fire-fighting capabilities. These are areas where Australia could greatly aid its northern neighbours — despite the near-sighted views of the Abbott government, which is proposing to slash overseas aid across the Pacific region.

We also need to get wise about rural development. From New Guinea to Siberia, there are serious hidden costs to development schemes that open up pristine landscapes to human incursions. Yes, we need economic growth, but we can't tally up the benefits of reaping and razing the Earth without also taking into account its many financial, social and environmental

impacts.

Beyond this, we need to plan better for a climatically risky future. Nations such as India, for example – whose agriculture is intensely vulnerable to drought – are hugely exposed to such dangers. Long-term drying conditions and increasingly intense wildfires are virtually reshaping lands in the American West. And across much of the world, burgeoning cities are also at risk – and are already guzzling down torrents of water vitally needed for farming and nature.

Intense fires are reshaping the land and public attitudes in the American West.

Ultimately, it doesn't make a lot of sense to do in-depth research on droughts on the one hand, and to ignore its far-reaching implications on the other. It's time to get ready for the next big drought – and the one after that. Better to prepare in advance than to risk battling a fire-breathing monster.



Fire
Forests
Climate
Drought
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La Nina
El Nino
forest